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(54) **A DEVICE AND A METHOD FOR INDICATING WHEN A FIRST ELEMENT IS RELEASABLE FROM A SECOND ELEMENT**

(57) A device (10) for indicating when a first element (11) is releasable from a second element (12), comprising a rotatable locking device (13) for locking the first element (11) to the second element (12), wherein the locking device (13) is connected to the first element (11) and is rotatable around an axis (A) of rotation between an unlocked position and a locked position in which a protrusion (19) of the locking device engages a projection (26) of the second element (12). The locking device (13) comprises an axially extending first abutment surface

(20) being offset from the axis (A) of rotation. The second element (12) comprises an axially extending second abutment surface (28) arranged in a position for engaging the first abutment surface (20) of the locking device (13) when the locking device (13) has been rotated to the unlocked position, and, by further rotation of the locking device (13), displacing the first and second elements (11, 12) in relation to each other. Also, a method for indicating when a first element (11) is releasable from a second element (12) is disclosed.

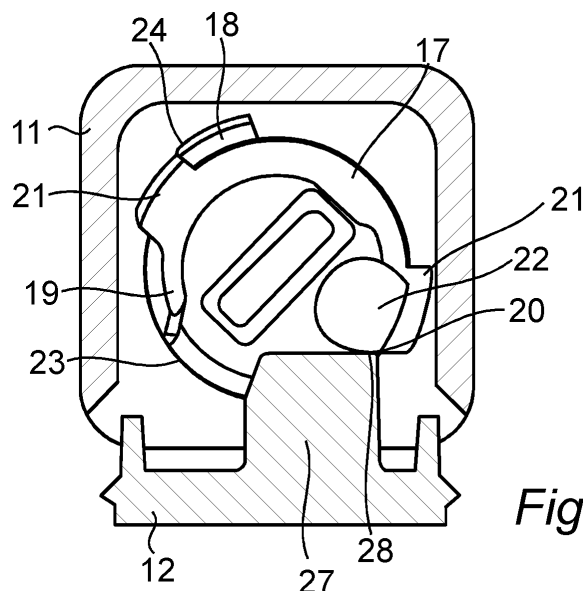


Fig. 24

Description

TECHNICAL FIELD

[0001] The invention relates to a device for indicating when a first element is releasable from a second element. More specifically, the present invention relates to a device comprising the first element, the second element and a rotatable locking device for locking the first element to the second element in a locked position, wherein the device is arranged to indicate when the locking device is in an unlocked position and the first element is releasable from the second element.

[0002] Devices of this type can be used for a variety of products and for a variety of purposes. One example is a casing and bracket comprising the first element in the form of a casing or casing front cover and the second element in the form of the bracket, such as a wall bracket or similar, wherein the locking device connects the casing or front cover to the bracket. Alternatively, the second element is a back cover of the casing. Other examples of the first and second elements may include motor components, pipes, toy components, tool components or generally any elements that are releasably fastened to each other by means of the locking device.

[0003] The device according to the present invention can be used for a casing and bracket to an intrusion alarm system component, such as an intrusion alarm detector or an intrusion alarm gateway. Such alarm system components are often mounted on a structure, such as a wall, a door, a window frame, etc., wherein a casing is mounted on a bracket. Such alarm systems are commonly used in domestic houses and office premises as well as other buildings as alarm systems to detect unauthorised intrusion such as burglary, damages and similar.

[0004] The invention relates to a method for indicating when a first element is releasable from a second element

PRIOR ART

[0005] Devices comprising a first element, a second element and a rotatable locking device for fastening the first element to the second element are known in the prior art. One type of such prior art device is disclosed in EP3009810.

[0006] One problem with such prior art devices is that they can be difficult to assemble and disassemble. One problem with such prior art devices is, e.g. that they may be damaged if force is applied to remove the first element from the second element when the locking device is in the locked position. Similarly, damages can occur if the first element is forced on the second element when the locking device is in the locked position. Hence, there is a need for such a device, which indicates when the first element is releasable from the second element.

SUMMARY OF THE INVENTION

[0007] An object of the present invention is to avoid the problems of the prior art and provide a device having a first element, a second element and a locking device for releasably fastening the first element to the second element, which device indicates when the first element is releasable from the second element for safe and efficient assembly and disassembly of the device.

[0008] The present invention relates to a device for indicating when a first element is releasable from a second element, comprising the first element, the second element and a locking device for locking the first element to the second element, wherein the locking device comprises an axis of rotation and a protrusion for locking interaction with a projection of the second element, and wherein the locking device is connected to the first element and is rotatable around the axis of rotation between an unlocked position and a locked position in which the protrusion of the locking device engages the projection of the second element, characterised in that the locking device comprises an axially extending first abutment surface being offset from the axis of rotation, and the second element comprises an axially extending second abutment surface arranged in a position for engaging the first abutment surface of the locking device when the locking device has been rotated to the unlocked position, in which unlocked position the protrusion of the locking device is disengaged from the projection of the second element, and, by further rotation of the locking device, radially displacing the locking device in relation to the second element while bringing the first element along therewith so as to displace the first and second elements in relation to each other. By means of the first and second abutment surfaces the first element is forced away from the second element to indicate that the device is unlocked and that the first element can be removed from the second element without damaging the device. For example, the device can be arranged to displace the first element in relation to the second element by means of the first and second abutment surfaces to form a gap between the first and second elements or parts thereof to indicate that the device is unlocked. Hence, the first and second elements are in a first position in relation to each other when the device is locked and are in a second position in relation to each other after displacement of the first element in relation to the second element in the unlocked position of the device. Hence, the first position corresponds to the locked position of the device, wherein the first and second elements, e.g. are aligned, and in the second position the device is unlocked and the first element is displaced in relation to the second element, e.g. to form a gap between them. The arrangement of the elements and the locking device results in a simple and effective assembly and disassembly of the device by an operator.

[0009] The abutment surface can be formed by an axially projecting structure of the locking device, such as a cylinder portion, block portion, a tube portion or similar.

The first and/or second abutment surfaces can be arched to smoothly rotate against the other of the first and second abutment surfaces.

[0010] The first and second elements can comprise flexible connecting means for detachably connecting the first element with the second element through inherent flexible properties of the material. For example, the flexible connecting means or the first and second elements can be made in plastic materials having somewhat resiliently flexible properties. The flexible connecting means can be positioned to detachably connect the first and second elements in a position in which they are radially displaced and, e.g. forming the gap between them. The first and second elements can comprise a first set of flexible connecting means and a second set of flexible connecting means, wherein the first set of flexible connecting means can be positioned to detachably connect the first and second elements in a first position, said first position corresponding to a locked position of the device, and wherein the second set of flexible connecting means is radially displaced in relation to the first set to detachably connect the first and second elements in a second position, in which second position the first element is displaced in relation to the second element compared to the positions of the first and second elements in the locked position of the device. This results in a device that is even easier to install and also to maintain and disassemble.

[0011] The invention also relates to a method for indicating when a first element is releasable from a second element of a device comprising the first element, the second element and a locking device for fastening the first element to the second element, comprising the steps of

- a) rotating the locking device (13) around an axis (A) of rotation to an unlocked position, in which unlocked position a protrusion (19) of the locking device (13) is disengaged from a projection (26) of the second element (12),
- b) bringing an axially extending first abutment surface of the locking device to engage an axially extending second abutment surface of the second element by said rotation, and
- c) displacing the locking device and the first element radially in relation to the second element by further rotation thereof around the axis (A) of rotation to indicate that the first element is releasable from the second element.

[0012] Further characteristics and advantages of the present invention will become apparent from the description of the embodiments below, the appended drawings and the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will now be described in more detail with the aid of exemplary embodiments and with reference to the accompanying drawings, in which:

- Fig. 1 is a schematic perspective view of a device comprising a first element, a second element and a locking device for fastening the first element to the second element according to one embodiment of the invention,
- Fig. 2 is a schematic view of a part of the device of Fig. 1, showing a first side of the locking device,
- Fig. 3 is a schematic perspective view of the locking device according to one embodiment of the invention,
- Fig. 4 is a schematic view of a second side of the locking device of Fig. 3,
- Fig. 5 is a schematic side view of the locking device according to Fig. 3,
- Fig. 6 is a schematic perspective view of the device according to an alternative embodiment,
- Fig. 7 is a schematic perspective view of the first element and the locking according to one embodiment,
- Fig. 8 is a schematic perspective view of an optional third element according to one embodiment,
- Fig. 9 is a schematic perspective view of the second element according to one embodiment,
- Fig. 10 is a schematic view of the device, illustrating the locking device in a locked position according to one embodiment,
- Fig. 11 is a schematic longitudinal section view of a part of the device, illustrating the locking device in the locked position,
- Fig. 12 is a schematic cross section view of a part of the device, illustrating the locking device in the locked position,
- Fig. 13 is a schematic view of the device, illustrating the locking device and the second element by dashed lines, wherein the locking device is in the locked position,
- Fig. 14 is a schematic cross section view along the line II-II in Fig. 13,
- Fig. 15 is a schematic cross section view along the line III-III in Fig. 13,
- Fig. 16 is a schematic view of the device, illustrating the locking device in an unlocked position ac-

- cording to one embodiment,
- Fig. 17 is a schematic longitudinal section view of a part of the device, illustrating the locking device in the unlocked position,
- Fig. 18 is a schematic cross section view of a part of the device, illustrating the locking device in the unlocked position,
- Fig. 19 is a schematic view of the device, illustrating the locking device and the second element by dashed lines, wherein the locking device is in the unlocked position,
- Fig. 20 is a schematic cross section view along the line II-II in Fig. 19,
- Fig. 21 is a schematic cross section view along the line III-III in Fig. 19,
- Fig. 22 is a schematic view of the device, illustrating the locking device in an unlocked and further rotated position according to one embodiment, in which the first element with the locking device is radially displaced in relation to the second element,
- Fig. 23 is a schematic longitudinal section view of a part of the device, illustrating the locking device in the unlocked and further rotated position,
- Fig. 24 is a schematic cross section view of a part of the device, illustrating the locking device in the unlocked and further rotated position,
- Fig. 25 is a schematic view of the device, illustrating the locking device and the second element by dashed lines, wherein the locking device is in the unlocked and further rotated position,
- Fig. 26 is a schematic cross section view along the line II-II in Fig. 25, and
- Fig. 27 is a schematic cross section view along the line III-III in Fig. 25.

DETAILED DESCRIPTION

[0014] With reference to Fig. 1 a device 10 according to one embodiment of the invention is illustrated. The device 10 comprises a first element 11, a second element 12 and a locking device 13. The locking device 13 is arranged for fastening the first element 11 to the second element 12. The device 10 also comprises an optional third element 14. For example, the first element 11 is a casing or a casing front cover, wherein the second ele-

ment 12 is a bracket for mounting on a structure, such as a wall, ceiling, door frame, window frame or any other suitable supporting structure. For example, the second element 12 is fastened to the supporting structure by means of conventional fastening means 15, such as screws or similar, wherein the first element 11 can be attached to the second element 12 by means of the locking device 13. For example, the third element 14 is a back cover, wherein the first element 11 and the third element 14 form the casing for mounting on the second element 12. According to one embodiment, the first element 11 and the third element 14 form a box-shaped enclosure. For example, the device 10 is an intrusion alarm component, wherein the first element 11 is a casing or cover containing electronic parts, a detector, an intrusion alarm gateway or similar, and wherein the first element 11 is arranged for mounting on the second element 12 in the form of a bracket. In the embodiment of Fig. 1 the device 10 is, for example, an intrusion alarm gateway or a casing and bracket for an intrusion alarm gateway. Alternatively, the first element 11 and the second element 12 are any suitable type of structures for attachment to each other by means of the locking device 13. For example, the first element 11 and the second element 12 are motor components, toy components, tool components, electrical components, pipes, or generally any two elements for releasable fastening to each other by means of the locking element 13. The device 10 is, for example, made of plastic materials, which plastic materials optionally have inherent resilient flexible properties. For example, the device 10 is exclusively made of plastic materials.

[0015] With reference to Fig. 2 a part of the device 10 is illustrated, wherein an exterior side of the locking device 13 is illustrated more in detail according to one embodiment. The locking device 13 is arranged in a wall part of the first element 11, wherein an exterior face of the locking device 13, for example, extends in a plane of said wall. In the illustrated embodiment, the locking device 13 comprises a groove 16 for receiving a tool, such as a screwdriver, the peripheral part of a coin or any other suitable tool for rotating the locking device 13. The groove 16 extends across the exterior face of the locking device 13.

[0016] With reference to Figs. 3-5 the locking device 13 is illustrated according to one embodiment. The locking device 13 comprises an axis of rotation A, a cylinder portion 17, a flange 18 and a protrusion 19. The cylinder portion 17 extends along the axis of rotation A and is arranged between the flange 18 and the protrusion 19. The flange 18 extends radially from a first end of the cylinder portion 17, wherein the protrusion 19 extends axially from a second end of the cylinder portion 17. For example, the flange 18 extends around the entire periphery of the first end of the cylinder portion 17. Alternatively, the flange 18 is interrupted by cuts forming tabs or similar distributed around the periphery of the first end of the cylinder portion 17. For example, the cylinder portion 17 is formed with a circular cross section or a substantially

circular cross section to be able to be rotated in an aperture, which is described more in detail below. The protrusion 19 is displaced from the axis of rotation A. Hence, the protrusion 19 is displaced in the radial direction in relation to the axis of rotation A and a centre of the locking device 13. The protrusion 19 is, e.g. formed as an axial extension of the periphery of the cylinder portion 17 around a part thereof, wherein the protrusion 19, for example, is formed as an arc-shaped rib. The locking device 13 also comprises a first abutment surface 20 being offset from the axis A of rotation. The locking device 13 also comprises one or more radial extensions 21, such as a radially extending tabs or similar. The radial extension 21 is connected to the second end of the cylinder portion 17, forming a gap in the axial direction between the radial extension 21 and the flange 18. Hence, the radial extension 21 is axially displaced in relation to the flange 18. In the illustrated embodiment, the locking device 13 is provided with an axially extending pin 22, e.g. extending axially from the cylinder portion 17, said pin 22 comprising the first abutment surface 20 and being positioned offset from the axis of rotation A. Alternatively, the first abutment surface 20 is formed by a radial extension extending radially from the cylinder portion 17.

[0017] With reference to Figs. 6-9 one embodiment of the device 10 is disclosed, wherein the first element 11 is a casing and the second element 12 is a bracket or a back cover for an intrusion alarm detector, such as a door detector or a window detector or similar. According to the embodiment of Figs. 6-9 the device 10 comprises the first element 11, the second element 12, the locking device 13 and the optional third element 14. The first element 11, the second element 12, the locking device 13 and the third element 14 are, for example, made entirely of plastic materials, such as moulded plastic articles. Alternatively, the device 10 comprises metal parts, such as an exterior part of the locking device 13.

[0018] The first element 11 is, for example, formed as a casing having an aperture 23 and a notch 24 for receiving the locking device 13. For example, the first element 11 comprises three interconnected walls substantially forming a U-shape, and first and second end walls, wherein the aperture 23 is arranged in one of said end walls. The locking device 13 is formed with the groove 16 for receiving a tool to rotate the locking device 13. The locking device 13 also comprises the radial extension 21 to be fitted through the notch 24. Hence, the first element 11 comprises the through aperture 23 and the notch 24, wherein the aperture 23 is formed with an irregularity in the form of the notch 24. For example, the aperture 23 is circular or substantially circular, wherein the notch 24 extends from an imaginary circumference of the circular aperture 23 and around a portion of the circumference to form the notch 24 in the first element 11. The aperture 23 can also be described as having a circular or substantially circular first part and a second part in the form of the notch 24 as an irregularity on the periphery of the circular part of the aperture 23. In the illustrated embod-

iment, the notch 24 is substantially rectangular but can be of any desired shape.

[0019] To assemble the device 10 the radial extension 21 of the locking device 13 is aligned with the notch 24, so that the protrusion 19 and the cylinder portion 17 of the locking device 13 can be inserted into the aperture 23. The protrusion 19 is inserted into the aperture 23. The radial extension 21 is fitted over the notch 24 while the cylinder portion 17 is fitted over the aperture 23. Then, the cylinder portion 17 is inserted into the aperture 23 while the radial extension 21 is inserted through the notch 24 until the flange 18 engages a first side, such as an exterior side, of the first element 11, so that the cylinder portion 17 is rotationally fitted in the aperture 23 and the radial extension 21 is arranged at a second side of the first element 11, such as an interior side. Hence, the aperture 23 is arranged for receiving the cylinder portion 17 of the locking device 13. Then the locking device 13 is rotated around the axis of rotation A, so that the radial extension 21 is rotationally displaced in relation to the notch 24 and the locking device 13 is prevented from axial displacement by means of the flange 18 and the radial extension 21. The flange 18 prevents the locking device 13 from falling into the aperture 23. Hence, the flange 18 has larger diameter than the aperture 24 or comprises parts extending radially beyond the circumference of the aperture 23.

[0020] The protrusion 19 is arranged for locking engagement with the projection 26 by rotation of the locking device 13, wherein displacement of the first element 11 in relation to the second element 12 is prevented. When the locking device 13 is rotated, the protrusion 19 engages the projection 26. The radially extending portion 27 supporting the projection 26 extends axially, so that the projection 26 is positioned between the protrusion 19 and the axis A of rotation. For example, the engaging surfaces of the protrusion 19 and the projection 26 are arc-shaped for locking the first element 11 to the second element 12 efficiently. For example, the engaging surfaces of the protrusion 19 and the projection 26 are arc-shaped around the axis A. For example, the engaging surfaces of the protrusion 19 and the projection 26 are arranged for locking in the radial direction. Axial displacement of the first element 11 in relation to the second element 12 is, for example, prevented by means of pins and openings or any other suitable parts of the first and second elements 11, 12. Alternatively, the first and second elements 11, 12 comprise radially extending and interacting parts to prevent undesired axial displacement between them.

[0021] The third element 14 according to one embodiment is disclosed in Fig. 8. The third element 14 is, for example, arranged as a back cover or an inner frame for mounting on or in the first element 11. The third element 14 is provided with a stop 25 to prevent the locking device 23 from rotating to a position in which the radial extension 21 is aligned with the notch 24. For example, the third element 14 prevents the locking device 13 from rotating back beyond the stop 25. The stop 25 is, e.g. formed as

an axially extending part. For example, the stop 25 is positioned to engage a radially extending element of the locking device 13, such as the radial extension 21 to prevent further rotation of the locking device 13. For example, the third element 14 is fixed to the first element 11. For example, the third element 14 is fixed to the first element 11 by means of conventional fastening means, such as screws, snap-locking means using mutually engaging parts and an inherent flexibility of the material, adhesives or any other suitable fastening means.

[0022] The second element 12 according to one embodiment is disclosed in Fig. 9. The second element 12 is provided with an axially extending projection 26 for interaction with the protrusion 19 of the locking device 13. In the illustrated embodiment, the projection 26 is supported by a radially extending portion 27 to form a gap between a base of the second element 12 and the projection 26 for receiving the protrusion 19.

[0023] The second element 12 comprises a second abutment surface 28 for interaction with the first abutment surface 20 of the locking device 13. The second abutment surface 28 is arranged in the rotational path of the first abutment surface 20, said first abutment surface 20 being displaced from the axis of rotation A. The second abutment surface 28 is arranged as a stop for the rotating locking device 13 by engaging the first abutment surface 20 thereof. The second abutment surface 28 extends in the axial and/or radial direction. For example, the second abutment surface 28 extends substantially in parallel to a plane of the base of the second element 12. For example, the second abutment surface 28 is formed by the projection 26. Alternatively, the second abutment surface 28 is formed by another axially and/or radially extending component or portion of the second element 12.

[0024] In the embodiment of Fig. 9 the second element 12 comprises a first set of flexible connecting means 29, such as bulges, for interaction with a corresponding first set of flexible connecting means, such as bulges or indentations, of the first element 11 to detachably connect the first and second elements 11, 12 in a first position by inherent resilient flexible properties of said flexible connecting means and/or the first and second elements 11, 12. The second element 12 also comprises a second set of flexible connecting means 30 for interaction with a corresponding second set of flexible connecting means of the first element 11 to detachably connect the first and second elements 11, 12 in a second position, which second position is displaced in relation to the first position, by inherent resilient flexible properties of said flexible connecting means and/or the first and second elements 11, 12.

[0025] With reference to Figs. 10-15 the device 10 is illustrated schematically in a locked position, wherein the locking device 13 is connected to the first element 11 and the protrusion 19 is engaging the projection 26 to prevent radial displacement of the first element 11 in relation to the second element 12. The first element 11 with the locking device 13 is fitted to the second element 12. When

the locking device 13 is rotated from the unlocked position to the locked position around the axis of rotation A, the protrusion 19 is rotated into locking engagement with the projection 26. The projection 26 extends substantially in the same direction as the protrusion 19, such as axially, and is displaced radially in relation to the protrusion 19, so that the protrusion 19 can be positioned in contact with the projection 26 to prevent radial displacement of the first element 11 in relation to the second element 12. Hence, the protrusion 19 and the projection 26 are formed with mutually engaging surfaces resulting from the axially extending protrusion 19 and projection 26. In the illustrated embodiment, the projection 26 is arranged on the radially extending portion 27, wherein the radially extending portion 27 and the projection 26 together form an L-shaped structure or a hook structure. In the locked position the first element 11 is arranged in a predetermined first position in relation to the second element 12. For example, the first and second elements 11, 12 are aligned in said first position. For example, the first and second elements 11, 12 are engaging each other along substantially their entire length in the axial direction, wherein the first and second elements 11, 12 are arranged without a gap between them in said first position.

[0026] As illustrated in Fig. 14 the first element 11 is connected to the second element 12 in the first position and the locked position also by means of the first set of flexible connecting means 29, wherein the second set of flexible connecting means 30 are disengaged from each other as illustrated in Fig. 15. In the illustrated embodiment, the first and second sets of flexible connecting means 29, 30 are formed by interacting bugles and indentations.

[0027] As illustrated in Figs. 11-15 the first abutment surface 20 is arranged with a gap to the second abutment surface 28 in the locked position.

[0028] With reference to Figs. 16-21 the device 10 is illustrated schematically in the unlocked position, wherein the locking device 13 is connected to the first element 11 and the protrusion 19 is disengaged from the projection 26 to allow radial displacement of the first element 11 in relation to the second element 12. However, in the unlocked position according to Figs. 16-21 the first and second elements 11, 12 are still in the first position. Hence, the first element 11 with the locking device 13 is still fitted to the second element 12. When the locking device 13 is rotated from the locked position to the unlocked position around the axis of rotation A, which is illustrated by means of the arrow B in Fig. 16, the protrusion 19 is rotated to disengage from the projection 26. Simultaneously, the first abutment surface 20 is rotated towards the second abutment surface 28. When the protrusion 19 is disengaged from the projection 26 or after the protrusion 19 has been disengaged from the projection 26, the first abutment surface 20 is brought to engage the second abutment surface 28, which is illustrated in Figs. 17-21. In Figs. 16-21 the device 10 is in the unlocked position but the first element 11 is still in the first position

in relation to the second element 12, wherein the first and second elements 11, 12, e.g. are aligned. Hence, the first and second elements 11, 12 are, e.g. still engaging each other along substantially their entire length in the axial direction, wherein the first and second elements 11, 12, e.g. are arranged without a gap between them.

[0029] As illustrated in Fig. 20 the first element 11 is still connected to the second element 12 also by means of the first set of flexible connecting means 29, wherein the second set of flexible connecting means 30 are disengaged from each other as illustrated in Fig. 21.

[0030] With reference to Figs. 22-27 the device 10 is illustrated schematically, wherein the first element 11 has been displaced in relation to the second element 12, so that the first and second elements 11, 12 are in a second position, which second position is displaced in relation to the first position described above. In Figs. 22-27 the device 10 is in the unlocked position and the locking device 13 has been rotated further from the unlocked position, which is illustrated by means of the arrow C in Fig. 22. Hence, the locking device 13 has been rotated further in the same direction as from the locked position to the unlocked position. Hence, the protrusion 19 has been rotated further away from the projection 26 and the protrusion 19 is disengaged from the projection 26 to allow radial displacement of the first element 11 in relation to the second element 12. When the locking device 13 is rotated further around the axis of rotation A, the first abutment surface 20 is forced against the second abutment surface 28 and results in a displacement of the locking device 13 in relation to the second element 12. As the locking device 13 is rotatably connected to the first element 11 the first element 11 is brought along the locking device 13 and, hence, also displaced in relation to the second element 12. Due to continued rotation of the locking device 13 after the first abutment surface 20 has engaged the second abutment surface 28 the first element 11 will be forced away from the second element 12, substantially in the radial direction, i.e. perpendicular to the axis of rotation A of the locking device 13. The displacement of the first element 11 in relation to the second element results in an indication, such as a visual indication, e.g. in the form of a gap between parts of the first and second elements 11, 12, that the device 10 is in the unlocked position and that the first element 11 is releasable from the second element 12.

[0031] As illustrated in Fig. 26 the first set of flexible connecting means 29 has been disengaged, wherein the first element 11 is detachably connected to the second element 12 in the displaced second position by means of the second set of flexible connecting means 30. It is understood that the first and/or second sets of flexible connecting means 29, 30 are optional.

[0032] According to one embodiment the locking device 13 is arranged with a predetermined frictional resistance against the first element 11 depending on the rotational position of the locking device 13. Hence, the locking device 13 and the first element 11 are arranged to provide

a higher rotational friction of the locking device 13 in a first rotational position area of the locking device 13 than in a second rotational position area thereof. For example, the higher rotational friction is set so that a tool is required for rotating the locking device 13, wherein the lower rotational friction is set to allow rotation of the locking device 13 without any tool. The first rotational position area corresponds to the locked position, wherein the second rotational position area corresponds to the unlocked position of the locking device 13. Hence, the higher rotational friction is set to prevent the locking device 13 from being rotated from the locked position to the unlocked position without a tool. Also, the higher rotational friction prevents the locking device 13 from unintentional rotation from unlocked position to locked position, e.g. during transport or handling of the device 10 being delivered in unlocked position. The lower rotational friction, which for example is zero, is set so that the locking device 13 easily can be rotated during assembly of the device 10. For example, the first rotational position area is an area extending from a first angle to a second angle, wherein the first angle is 0° and corresponds to the end position of the locking device 13 in the locked position. The second rotational position area extends from the second angle to a third angle. The second angle is larger than the first angle and hence larger than 0° but smaller than the third angle and also less than 360°. For example, the second angle is 270° or less or 180° or less. The second angle is, e.g. 20-180 degrees, 45-90 degrees or 50-55 degrees, such as 52 degrees. The third angle is larger than the second angle and less than 360°. For example, the third angle is 270° or less or 180° or less. For example, the third angle is 30-300 degrees, 45-180 degrees or 50-135 degrees, such as 90 degrees. According to one embodiment at least the higher rotational friction of the locking device 13 is provided by means of one or more axial elevations (not illustrated in the drawings) on the first element 11 for engaging the flange 18 and/or the radial extension 21 of the locking device 13 when the locking device 13 is in its first rotational position area. The dimension of said one or more elevations in the axial direction is set to provide the desired rotational friction. The size of the first rotational position area is, e.g. set by the length of the flange surface and/or radial extension surface engaging said one or more elevations.

Claims

1. A device (10) for indicating when a first element (11) is releasable from a second element (12), comprising the first element (11), the second element (12) and a locking device (13) for locking the first element (11) to the second element (12), wherein the locking device (13) comprises an axis (A) of rotation and a protrusion (19) for locking interaction with a projection (26) of the second element (12), and wherein the locking device (13) is connected to the first element

(11) and is rotatable around the axis (A) of rotation between an unlocked position and a locked position in which the protrusion (19) of the locking device engages the projection (26) of the second element (12), **characterised in that**

- the locking device (13) comprises a first abutment surface (20) being offset from the axis (A) of rotation, and the second element (12) comprises a second abutment surface (28) arranged in a position for engaging the first abutment surface (20) of the locking device (13) when the locking device (13) has been rotated to the unlocked position, in which unlocked position the protrusion (19) of the locking device (13) is disengaged from the projection (26) of the second element (12), and, by further rotation of the locking device (13), displacing the locking device (13) in relation to the second element (12) while bringing the first element along (11) therewith so as to displace the first and second elements (11, 12) in relation to each other.
2. A device according to claim 1, wherein the first abutment surface (20) is formed by an axially projecting pin (22) of the locking device (13).
 3. A device according to claim 1 or 2, wherein the first abutment surface (20) is arched.
 4. A device according to any of the preceding claims, wherein the projection (26) of the second element (12) extends axially and is arranged between the protrusion (19) and the axis (A) when the locking device (13) is in its locked position, said projection (26) having a radially outwards facing locking surface for engaging the protrusion (19) of the locking device (13) in the locked position, and a radially inwards facing surface forming the second abutment surface (28).
 5. A device according to any of the preceding claims, wherein the protrusion (19) is offset from the axis (A) of rotation and wherein the first abutment surface (20) is angularly displaced around said axis (A) in relation to the protrusion (19).
 6. A device according to any of the preceding claims, wherein the first and second elements (11, 12) comprises flexible connecting means (30) for detachably connecting the first element (11) with the second element (12) through inherent flexible properties thereof, and wherein said flexible connecting means (30) are positioned to detachably connect the first and second elements when the first element (11) is displaced in relation to the second element (12).
 7. A device according to claim 6, wherein the first and

second elements (11, 12), respectively, comprise a first set of flexible connecting means (29) and a second set of flexible connecting means (30), wherein the first set (29) is positioned to detachably connect the first and second elements (11, 12) in a first position, and wherein the second set (30) is radially displaced in relation to the first set (29) to detachably connect the first and second elements in a second position.

8. A device (10) according to any of the preceding claims, wherein the locking device (13) comprises a cylinder portion (17) extending along the axis (A) of rotation, and a flange (18) extending radially from a first end of the cylinder portion (17), wherein the protrusion (19) is projecting from a second end of the cylinder portion (17), wherein the first element (11) is provided with a through aperture (23) for receiving the cylinder portion (17) of the locking device (13), and wherein the flange (18) of the locking device (13) engages a first side of the first element (11) at the aperture (23).
9. A device (10) according to claim 8, wherein a third element (14) is fixed to the first element (11), wherein the locking device (13) comprises a radial extension (21) extending around a part of the circumference of the cylinder portion (17), wherein the aperture (23) is formed with a notch (24) for receiving the radial extension (21), and wherein the third element (14) is provided with a stop (25) to prevent the locking device (13) from rotating to a position in which the extension (12) is aligned with the notch (24).
10. A device according to any of the preceding claims, wherein the first element (11) is a casing front cover.
11. A device according to any of the preceding claims, wherein the second element (12) is a bracket or a back cover.
12. An intrusion alarm component comprising a device (10) according to any of the preceding claims, and a detector and/or a processor and/or wireless communication means.
13. A method for indicating when a first element (11) is releasable from a second element (12) of a device (10) comprising the first element (11), the second element (12) and a locking device (13) for fastening the first element (11) to the second element (12), comprising the steps of
 - a) rotating the locking device (13) around an axis (A) of rotation to an unlocked position, in which unlocked position a protrusion (19) of the locking device (13) is disengaged from a projection (26) of the second element (12),

b) bringing a first abutment surface (20) of the locking device (13) to engage a second abutment surface (28) of the second element (12) by said rotation, and

c) displacing the locking device (13) and the first element (11) in relation to the second element (12) by further rotation of the locking device (13) around the axis (A) of rotation to indicate that the first element (11) is releasable from the second element (12).

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- 14.** A method according to claim 13, comprising the steps of detachably connecting the first element (11) with the second element (12) in a first position corresponding to the locked position by means of a first set of flexible connecting means (29) of the first and second elements (11, 12) through inherent flexible properties thereof, and after step c) detachably connecting the first element (11) with the second element (12) in a displaced second position by means of a second set of flexible connecting means (30) of the first and second elements (11, 12) through inherent flexible properties thereof.

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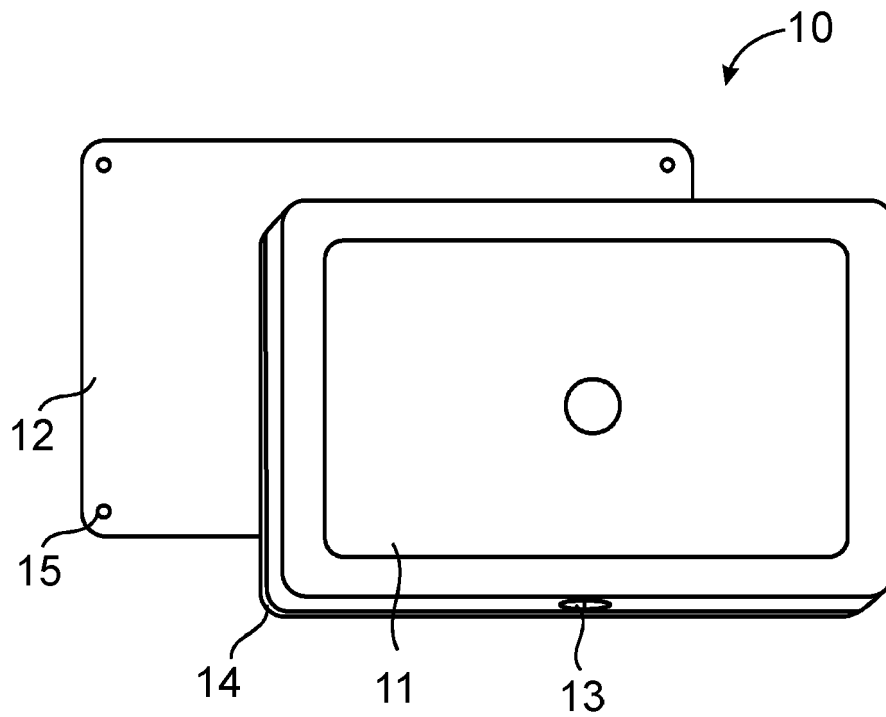


Fig. 1

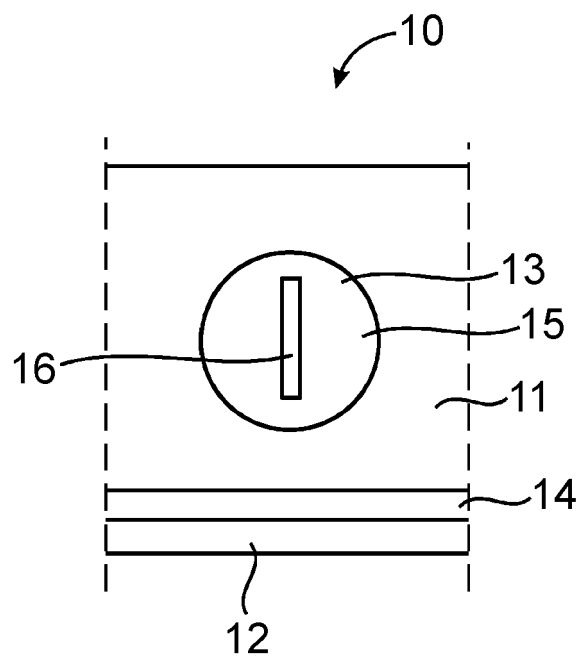


Fig. 2

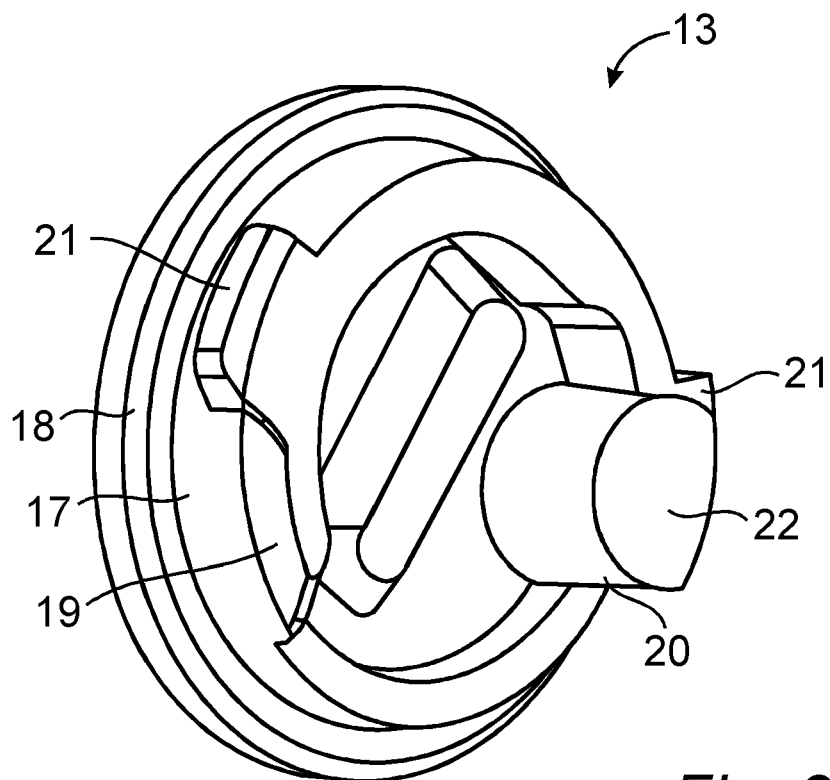


Fig. 3

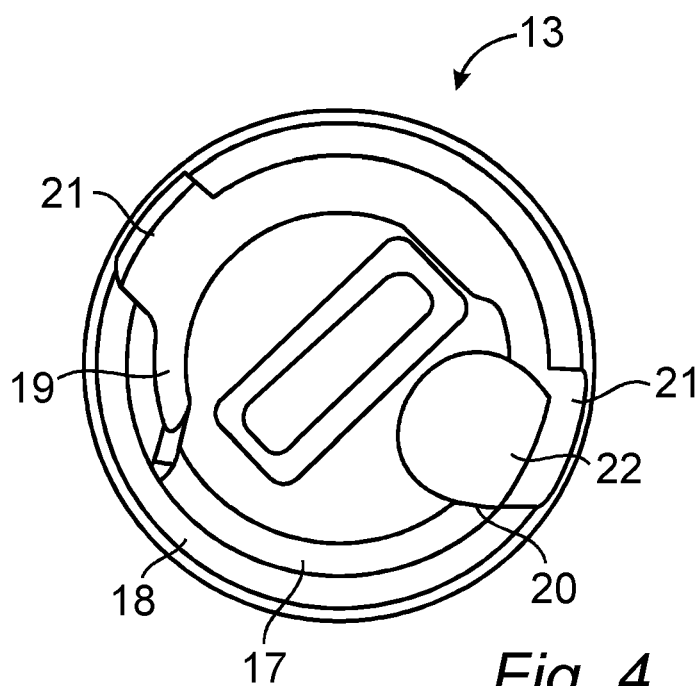


Fig. 4

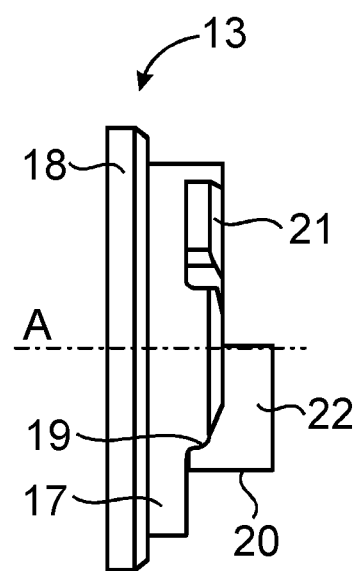


Fig. 5

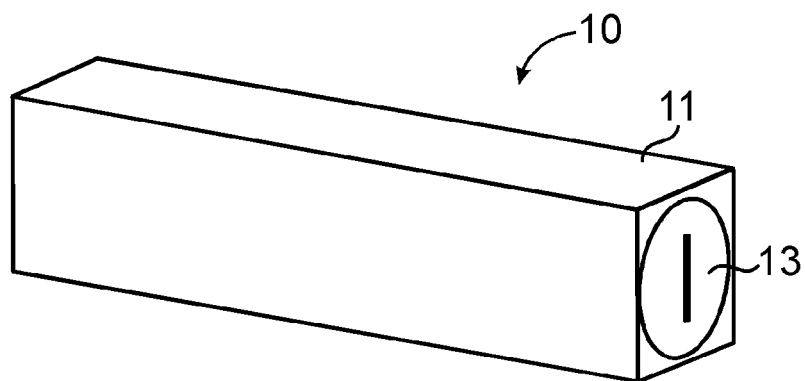


Fig. 6

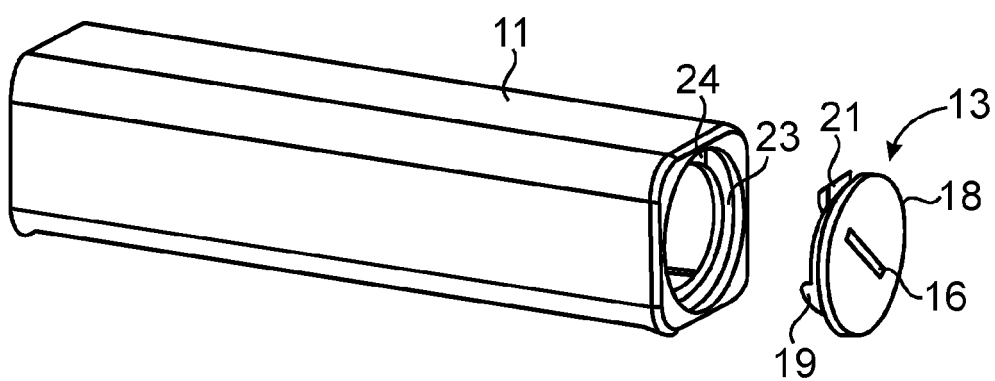


Fig. 7

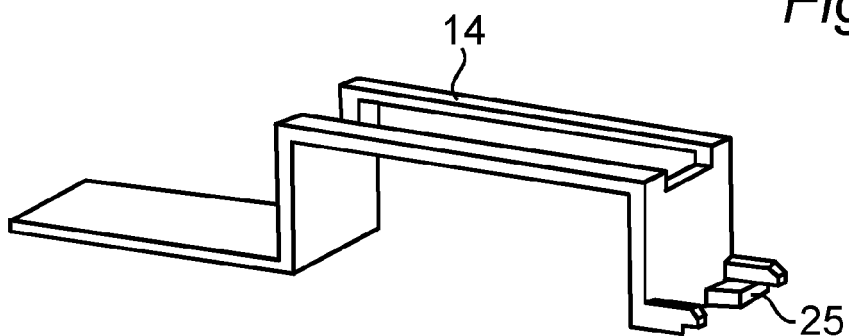


Fig. 8

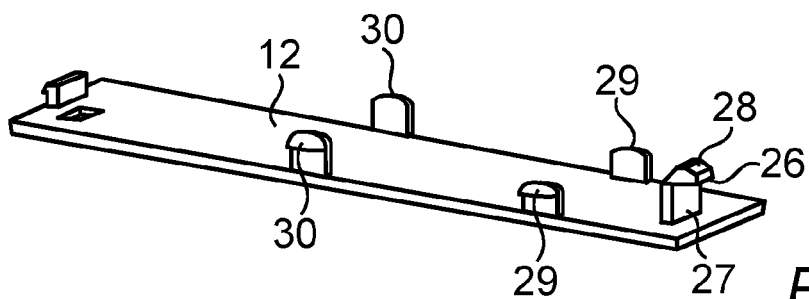


Fig. 9

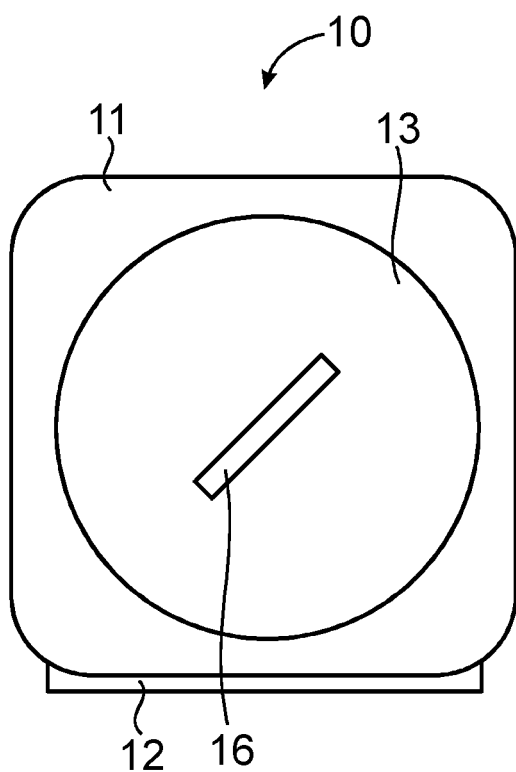


Fig. 10

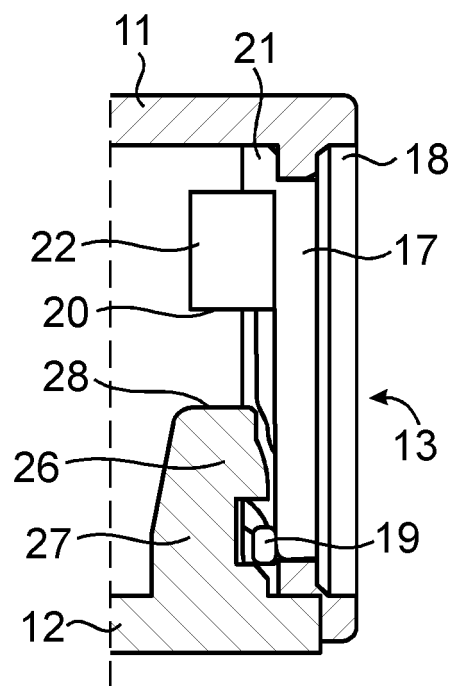


Fig. 11

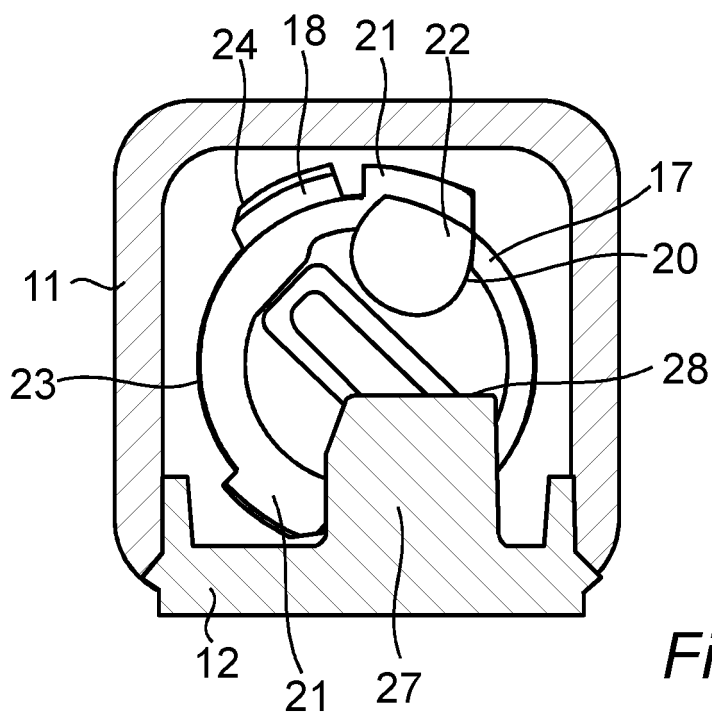
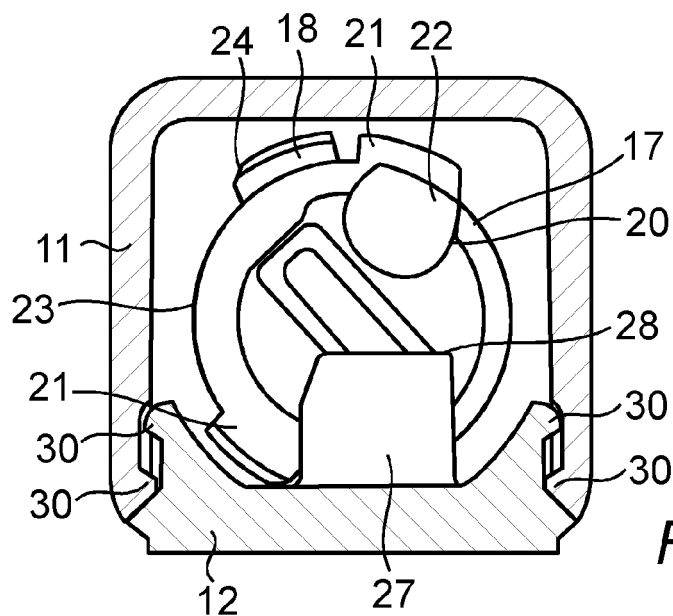
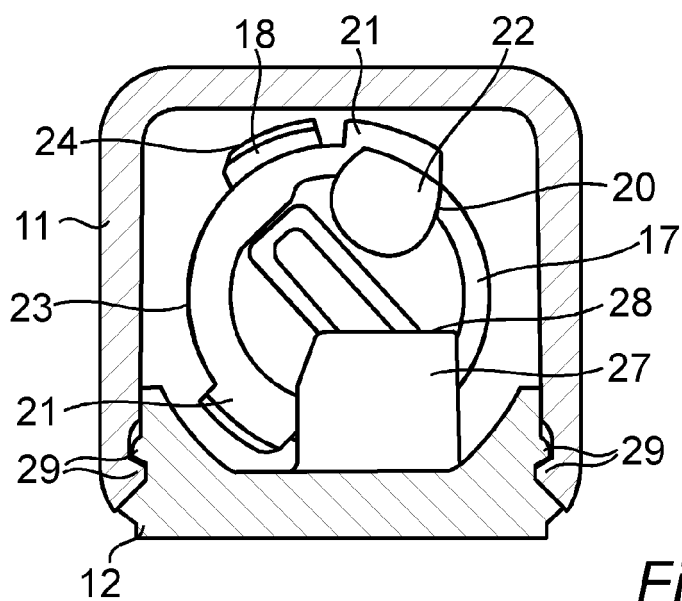
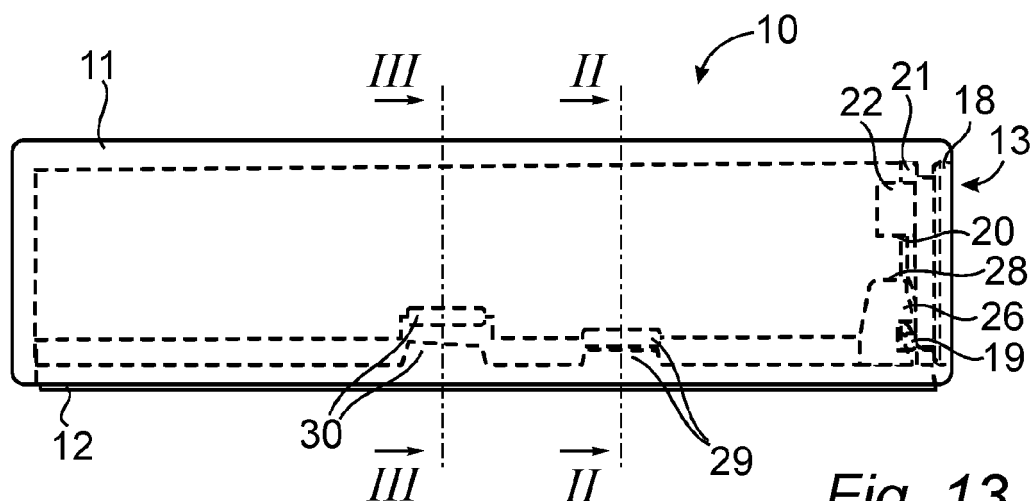


Fig. 12



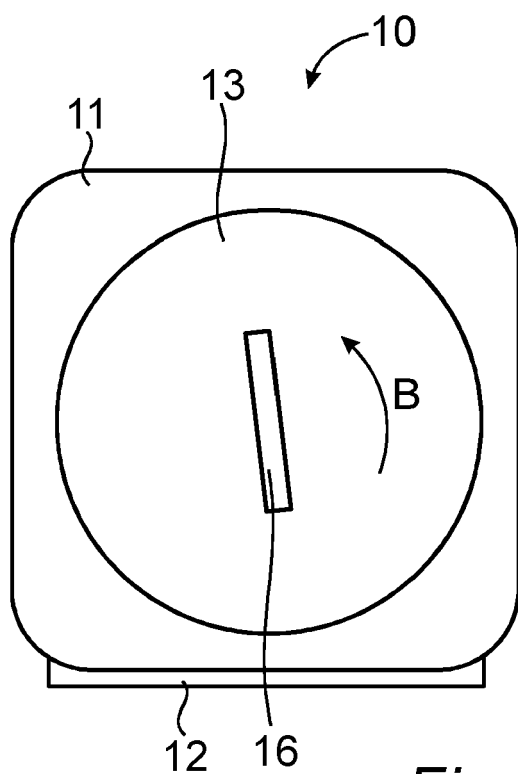


Fig. 16

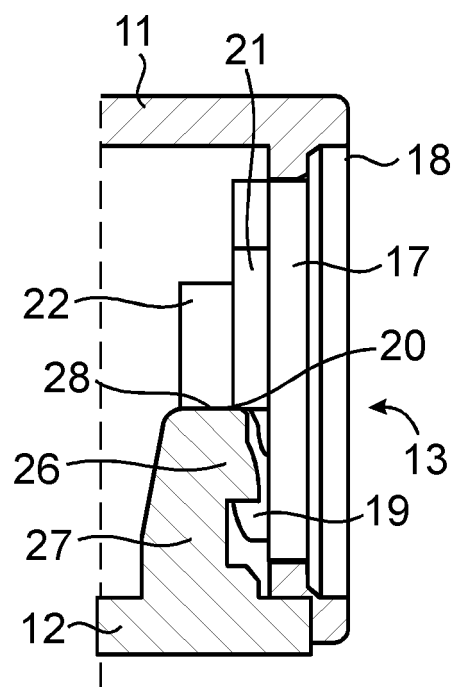


Fig. 17

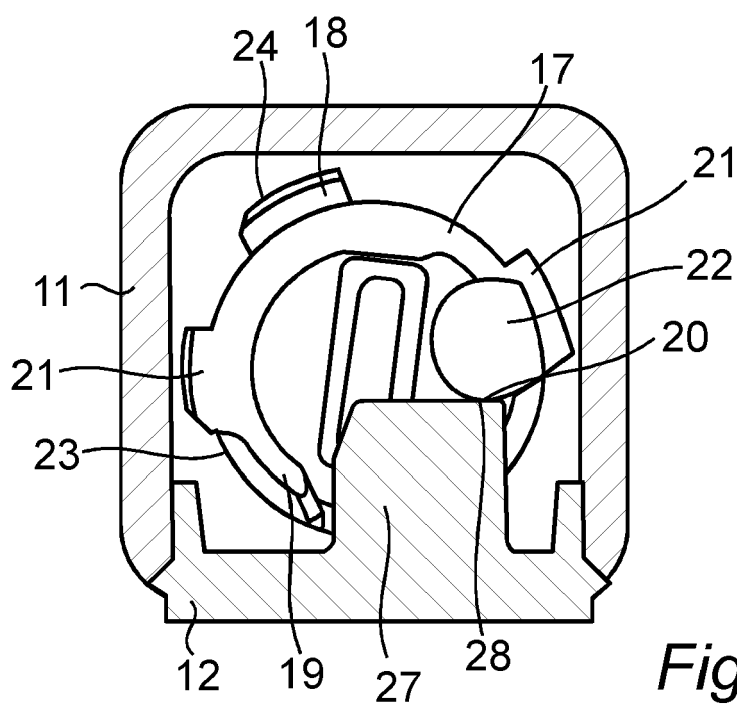
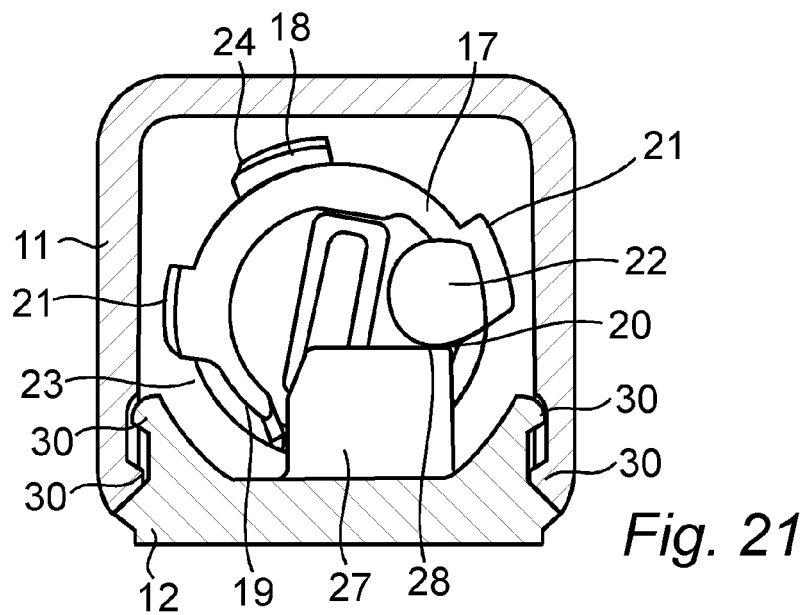
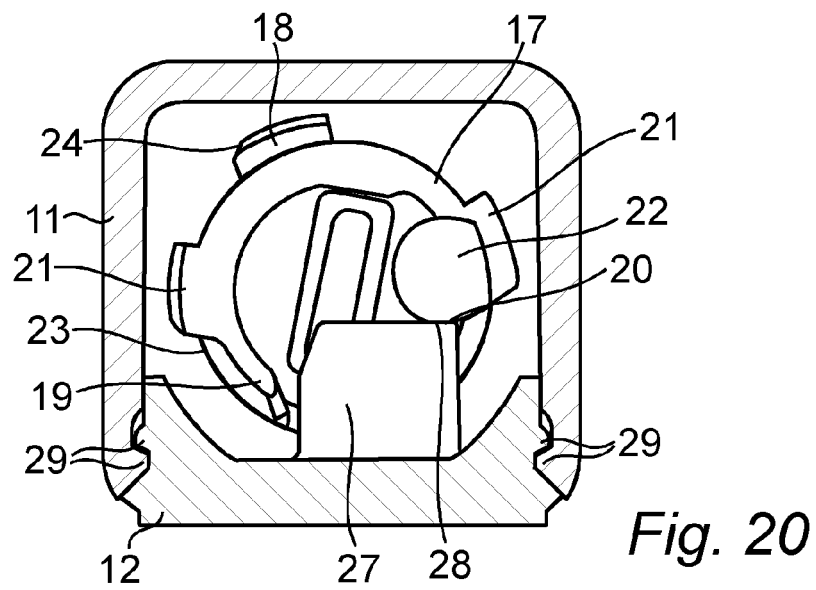
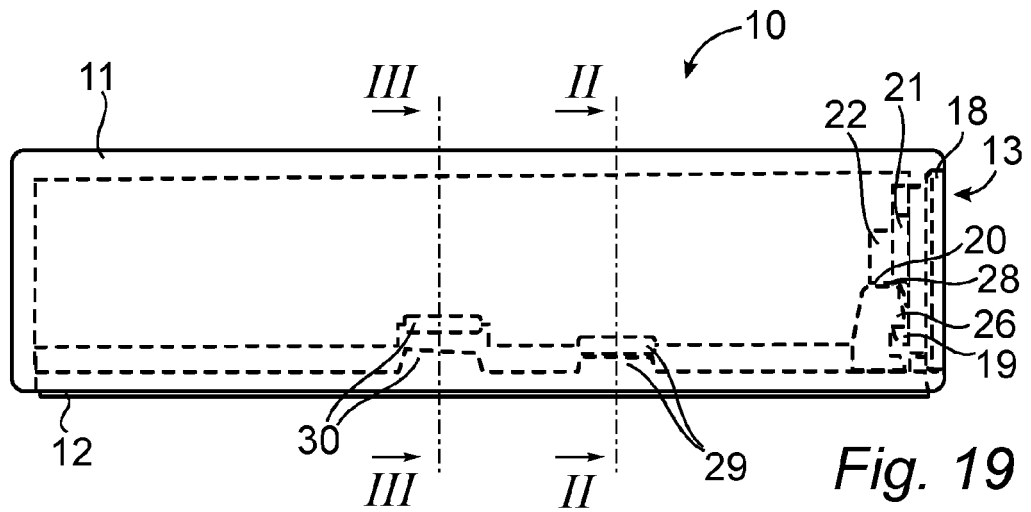


Fig. 18



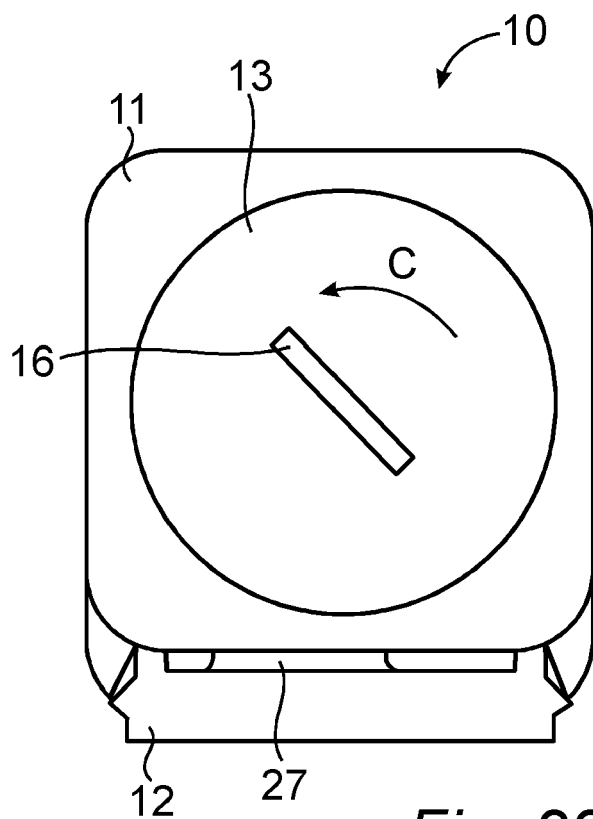


Fig. 22

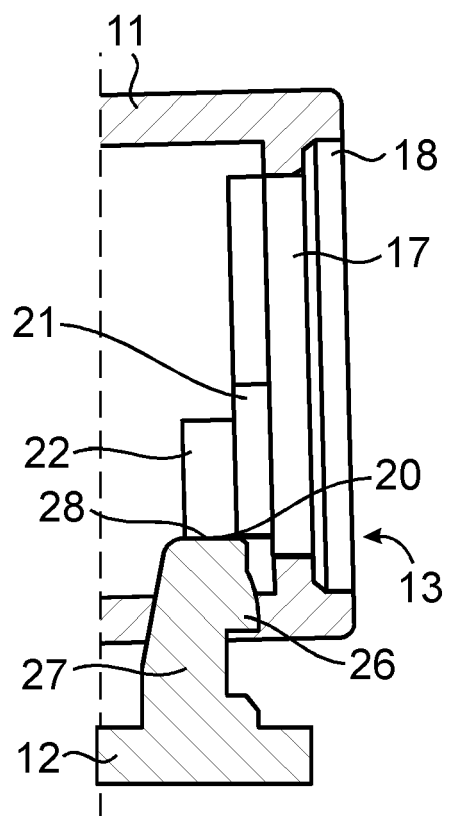


Fig. 23

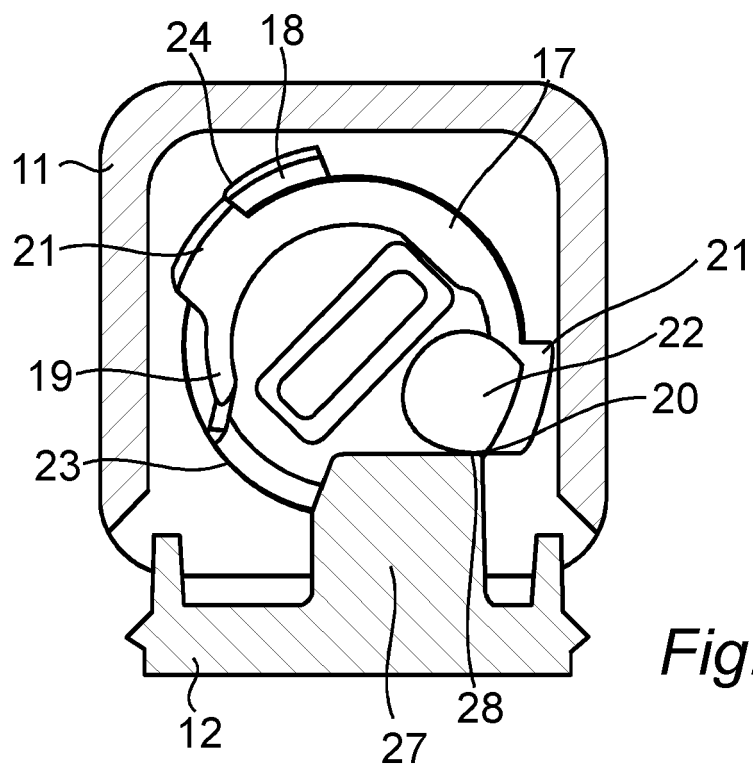


Fig. 24

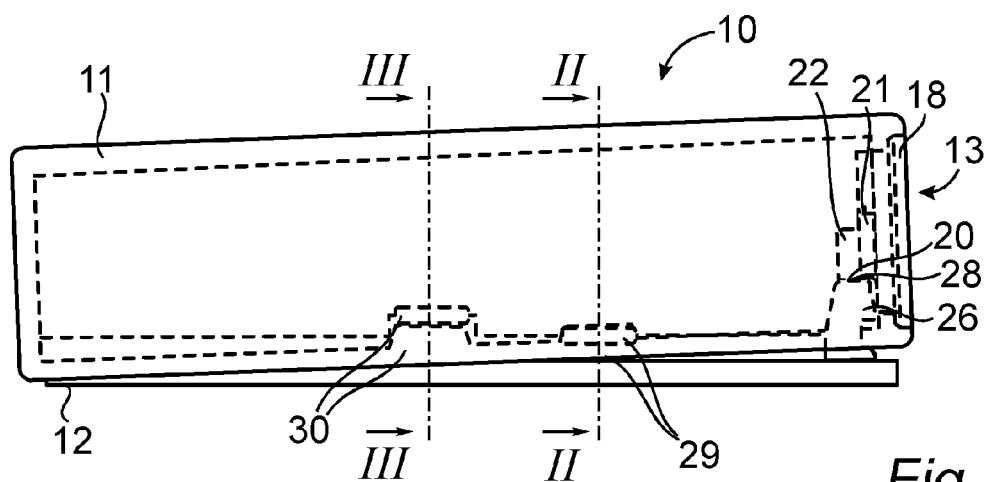


Fig. 25

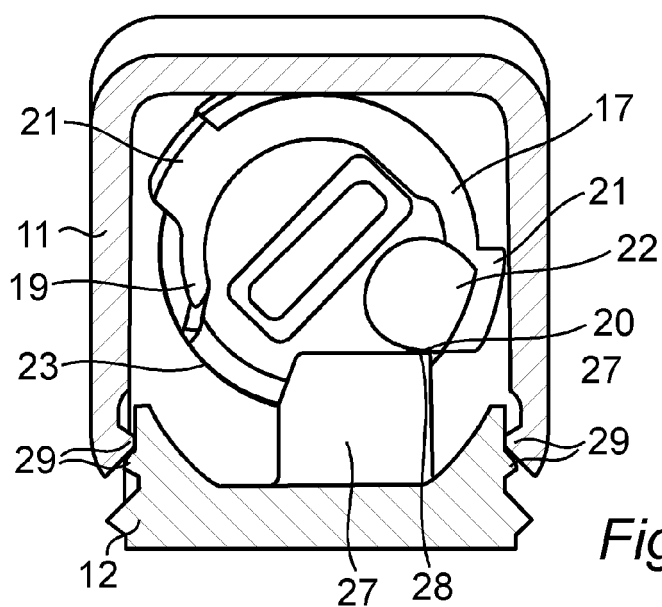


Fig. 26

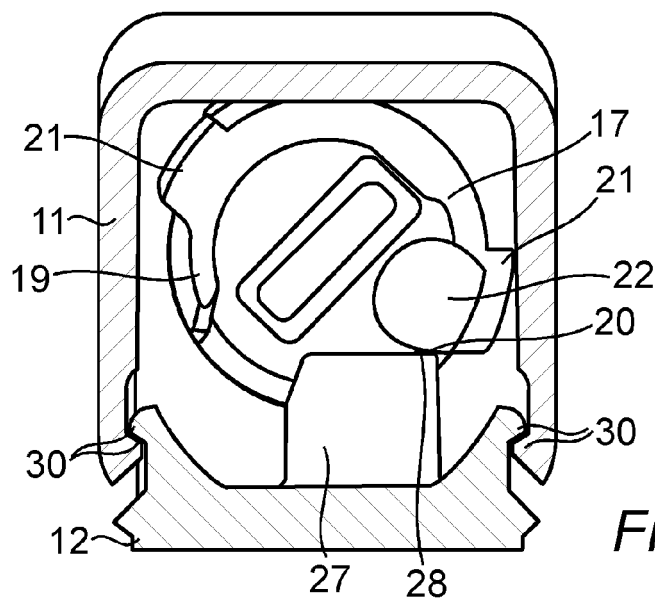


Fig. 27



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| Place of search The Hague | | Date of completion of the search 25 April 2022 | Examiner Pérez Méndez, José F |
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